

Derivative Cheat Sheet

Differentiation Rules:

Power Rule: $\frac{d}{dx}x^n = nx^{n-1}$

Constant Multiple Rule: $\frac{d}{dx}(kf(x)) = k\frac{df}{dx}$

Product Rule: $\frac{d}{dx}(fg) = \frac{df}{dx}g(x) + f(x)\frac{dg}{dx}$

Quotient Rule: $\frac{d}{dx}\left(\frac{f}{g}\right) = \frac{\frac{df}{dx}g(x) - f(x)\frac{dg}{dx}}{[g(x)]^2}$

Chain Rule: $\frac{d}{dx}f(u(x)) = \frac{df}{du}\frac{du}{dx}$

Derivatives:

- $\frac{d}{dx} \sin x = \cos x$
- $\frac{d}{dx} \cos x = -\sin x$
- $\frac{d}{dx} \tan x = \sec^2 x$
- $\frac{d}{dx} \cot x = -\csc^2 x$
- $\frac{d}{dx} \sec x = \sec x \tan x$
- $\frac{d}{dx} \csc x = -\csc x \cot x$
- $\frac{d}{dx} e^x = e^x$
- $\frac{d}{dx} a^x = a^x \ln a$
- $\frac{d}{dx} \arcsin x = \frac{1}{\sqrt{1-x^2}}$
- $\frac{d}{dx} \arccos x = -\frac{1}{\sqrt{1-x^2}}$
- $\frac{d}{dx} \arctan x = \frac{1}{1+x^2}$
- $\frac{d}{dx} \operatorname{arccot} x = -\frac{1}{1+x^2}$
- $\frac{d}{dx} \operatorname{arcsec} x = \frac{1}{|x|\sqrt{x^2-1}}$
- $\frac{d}{dx} \operatorname{arccsc} x = -\frac{1}{|x|\sqrt{x^2-1}}$
- $\frac{d}{dx} \ln x = \frac{1}{x}$
- $\frac{d}{dx} \log_a x = \frac{1}{x \ln a}$